MIAMI-DADE WATER USE EFFICIENCY
FIVE-YEAR PLAN

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EXECUTIVE SUMMARY

Recently enacted Florida legislation, Senate Bill 444 (June 2005) and House Bill 293 (June 2004) has changed the way public water suppliers plan and implement water conservation measures and best management practices (BMPs) as a condition of their Water or Consumptive Use Permit (WUP/CUP). SB 444 requires that public water suppliers work closely with their water management district when developing population and water use projections. These projections play a pivotal role in water use permitting and water conservation planning.

In order to obtain a new WUP/CUP or to modify or renew an existing WUP/CUP, water suppliers must develop a Water Conservation Plan. Plan requirements vary among water management districts, and conservation requirements also vary between permits within a single district. In order to provide more consistency and accountability in water conservation planning, the Florida Department of Environmental Protection (DEP) is working with the state's five water management districts and other stakeholders to develop a goal-based statewide water conservation program, called Conserve Florida. As part of the Conserve Florida program, a web-based guidance document for public water suppliers to use in developing, implementing, and reporting on water conservation measures and BMPs is being developed. This new and voluntary approach to water conservation planning, implementation and reporting is supported by South Florida Water Management District (SFWMD) and it is anticipated that once the Conserve Florida program is fully established, SFWMD will undergo rule changes to require large utilities in their jurisdiction to develop their water conservation programs as a goal-based plan using the guidelines and tools provided in the web-based Water Conservation Guidance Document.

In order to be current with the evolving legislative climate and to commit to a more accountable approach to water conservation, Miami-Dade Water and Sewer Department (MDWASD) is being proactive and updating its Water Conservation Plan as a Conserve

Florida goal-based program to be implemented over a five-year period.

The implementation of this Plan will improve the County's current level of water use efficiency. Historically, the County has implemented all required and four of the five optional (recommended) water conservation measures set forth by South Florida Water Management District. Table ES-1 shows all water conservation measures currently required and recommended for utilities governed by SFWMD. Also shown in Table ES-1 is an accounting of whether or not the measure is a Conserve Florida default measure.

MDWASD will also implement quantifiable BMPs in addition to SFWMD required and recommended measures as provided in this goal-based plan. The SFWMD measures certainly have an effect on water use but the effect is largely non-quantifiable. The Conserve Florida program includes a toolbox of non-quantifiable measures and quantifiable BMPs. The Conserve Florida measures and BMPs that MDWASD has included in this Plan are shown in Table ES-2. The water savings that will be achieved from implementing the BMPs in Table ES-2 are in addition to water savings that have been and will be achieved by implementing SFWMD measures. As such, MDWASD is providing reasonable assurance that this Plan will achieve effective water conservation beyond what is required by the District as a condition to obtaining a WUP.

Table ES-1. SFWMD Water Conservation Measures				
SFWMD Water Conservation Measures	**Is the Measure a Conserve Florida Default Measures for Large Utilities?**	**Implemented by MDWASD Prior to 2006?**	**Included in MDWASD's Five-year Plan?**	**See Section**
SFWMD Mandatory				
Water Conservation Plan	Yes	yes	yes	4.2.6
Adoption of an irrigation-hours ordinance	No	yes	yes	4.2.2
Adoption of an ultra-low volume fixtures ordinance	No	yes	yes	4.2.1
Adoption of a rain sensor device ordinance	No	yes	yes	4.2.3
Adoption of a water conservation based rate structure	Yes	yes	yes	4.2.8
Implementation of a leak detection and repair program	Yes	yes	yes	4.1.2
Implementation of a water conservation public education program	Yes	yes	yes	4.3
An analysis of reclaimed water feasibility	Study not required but replacing potable use with reclaimed water is a default BMP	yes	yes	4.4.1
SFWMD Supplementary Water Conservation Measures (recommended - not required)				
Wastewater Utility Infiltration Detection and Repair	No	yes	yes	4.1.2
Distribution System Pressure Control	Yes, selective usage of pressure-reducing valves is a default operational measure	yes	yes	4.1.3
Filter Backwash Recycling	No	yes	yes	4.1.4
Landscape Audits and Water-Efficient Technology	Yes	yes	yes	4.4.2
Indoor Audits and Water-Efficient Technology	Yes, for non-residential customers	no	yes	4.4.3 4.4.4 4.4.6

Table ES-2. Conserve Florida Default Measures and BMPs included in MDWASD's Five-year Plan			
	Effect on Demand	**Is the Measure/BMP Required or Recommended by SFWMD**	**See Section**
Conserve Florida Measures			
Source-water Metering	B	-	4.1.1.1
Service-connection Metering	B	-	4.1.1.1
Fixed-interval Meter Reading	B	-	4.1.1.2
Conservation Rate Structures	B	Required	4.2.8
Informative Billing	B	-	4.3.2
Test, Calibrate, Repair and/or Replace Meters	B	-	4.1.1.3
System Audit	A	Required	4.1.2
Leak Detection and Repair	A	Required if unaccounted-for water > 12%	4.1.2
Selective Usage of Pressure-reducing Valves	A	Recommended: Distribution System Pressure Control	4.1.3
Conservation Coordinator	B	-	4.1.5
Wholesale Water Supplier Assistance Programs	B	-	4.1.6
Landscape/Irrigation Ordinance Development and Implementation	P	Required	4.2.3
Public Information/Education	B	Required	4.3.2
Water Bill Inserts	B	-	4.3.2
Conserve Florida Quantifiable BMPs			
Water-Efficient Landscape and Irrigation Evaluations and Rebates	B	Recommended	4.4.2
High-Efficiency Clothes Washer Rebates	B	Recommended: Water Efficient Technology (as part of Indoor Audits)	4.4.3
Ultra Low Flush (ULF) Toilet Rebates	B	Recommended: Water Efficient Technology (as part of Indoor Audits)	4.4.4
Retrofit Kit Give Away	A	-	4.4.5
Industrial, Commercial and Institutional Water-Use Evaluations/Implementation	B	Recommended: Indoor Audits and Water Efficient Technology is recommended, but can be Residential or Non-residential	4.4.6

A=Affects average-day demand

P = Affects peak demand

B = Affects both average-day demand and/or peak demand

MDWASD will evaluate the plan on a annual basis and provide a report to SFWMD within six months following the previous year of implementation. The reports will compare planned against implemented number of measures, water saved/water savings rates, and the cost of implementation with respect to meeting planned goals (See Section 6 and Section 7).

If MDWASD concludes that adjusting planned implementation will more effectively achieve established goals, a plan adjustment will be proposed for the District's approval.

1.0 BACKGROUND AND INTRODUCTION

1.1 BACKGROUND

MDWASD has long been the water supplier for most of Miami-Dade County. As such, it has an exemplary record in regional and county-wide water planning efforts. MDWASD continues to take an active role in SFWMD water planning groups, such as the Lower East Coast Regional Water Supply Plan and the Water Resources Advisory Commission, and is also an active participant in building the Conserve Florida program. In order to be current with the evolving legislative climate discussed in the Executive Summary and to commit to a more accountable approach to water conservation, MDWASD is being proactive and updating their Water Conservation Plan as a Conserve Florida goal-based program to be implemented over a five-year period. This Plan greatly improves upon the previous Water Conservation Plan by including quantifiable BMPs with water savings and cost-effectiveness goals that will be evaluated on an annual basis.

MDWASD is currently requesting SFWMD to consolidate all WUPs into a single permit under WUP Permit Application Number 040511-5 and to allocate additional water supply. This Water Conservation Plan is intended to exceed the District's water conservation requirements as a condition to the permit.

1.2 INTRODUCTION

This Water Use Efficiency Plan is part of a long-range water conservation planning process which incorporates the goal of responsible stewardship of natural resources, while safeguarding the ongoing business practices of the Miami-Dade Water and Sewer Department. It is a goal-based, accountable plan that is tailored to the needs of the MDWASD service area.

The Water Use Efficiency Five-Year Plan for Miami Dade County has been developed as part of a long-term planning effort and its purpose is to achieve improved water use efficiency through implementation of proposed Best Management Practices that can substantially contribute to:

- Accommodating future economic development and population growth while protecting the resource;
- Reducing or deferring costs of maintaining and expanding water delivery, treatment, and disposal systems; and
- Reducing energy and maintenance costs of MDWASD facilities.

2.0 GOALS AND OBJECTIVES OF THE WATER USE EFFICIENCY PLAN

The overall goal of this Water Use Efficiency Five-Year Plan is to prevent and reduce wasteful, uneconomical, impractical, or unreasonable use of water resources per Section 373.227, Florida Statutes. Specific annual and 5-year goals of water savings and cost effectiveness are provided in Section 6.

The Water Use Efficiency Plan for Miami Dade County will contribute to a sustainable and healthy resource by providing a common framework for water management activities throughout the County. It advances water as a valuable resource to utilize efficiently, wisely and cost-effectively in order to sustain a high quality of social, environmental and economic well-being, for now and the future.

Following the State's directive, the overall objective of Miami Dade County's Water Use Efficiency Plan is to identify and promote supply- and demand-side management measures and best management practices for use by our retail and wholesale customers. Specific objectives of the Plan include:

Objective 1 – Improve Water-Use Efficiency

1.1 Maintain per capita water usage below the median of the previous five years' per capita consumption for the retail and wholesale service areas.

1.2 Raise public awareness of water conservation and encourage responsible public behavior by implementing a public education and information program.

1.3 Assist wholesale customers in continuing efforts towards water use efficiency.

1.4 Implement plumbing retrofit incentive programs and water audit projects.

1.5 "Lead by example" by assuring efficient use of water in County facilities through water use audits, and retrofit projects and Xeriscaping.

1.6 Continue to include public and private stakeholder groups in new program development and the implementation processes.

Objective 2 – Reduce the Loss and Waste of Water

2.1 Limit unaccounted-for water from the County's system to no more than 10 percent of the volume of water delivered based on a moving five-year average.

2.2 Maintain a program of universal metering (metering of all uses) and meter replacement and repair.

2.3 Maintain Infiltration and Inflow (I&I) Reduction Program.

2.4 Enhance tampering monitoring program to reduce unauthorized use which contributes to better water accounting.

2.5 Upgrade water system data analysis capabilities so that data can be more easily obtained and evaluated for water conservation purposes.

Objective 3 - Comply with Statewide Legislative Criteria and New Initiatives

3.1 Guide the development of legislation, policies, guidelines and standards to improve water use efficiency.

3.2 Identify, acknowledge and learn from past and current water use efficiency initiatives in Miami-Dade.

3.3 Engage community leaders, governmental agencies, water utilities and the public in addressing water supply issues through creative partnerships.

3.0 UTILITY PROFILE

This section of the Water Use Efficiency Five-Year Plan provides relevant information on the Miami-Dade Water and Sewer Department and its existing water conservation programs. The section contains information requested by the Conserve Florida Water Conservation Guidance Document that is currently being developed for the FDEP and is structured to parallel the Utility Profile Module of the Conserve Florida Web-based Water Conservation Guidance Document.

3.1 DESCRIPTION OF MDWASD AND ITS SERVICE AREA

Miami-Dade Water and Sewer Department is a retail and wholesale water supplier located in Miami-Dade County, Florida. Miami-Dade County is located in the Lower East Coast Regional Water Supply Planning Area of the South Florida Water Management District and within the footprint of the Comprehensive Everglades Restoration Plan (CERP).

The Miami-Dade Water and Sewer Department was originally created as an Authority in 1972 by the then Dade County Board of County Commissioners. In 1973, all properties held by the water and wastewater systems of the City of Miami and Dade County were placed under the control of the Authority. In 1983 the Board changed the status of the Authority to that of a county department under the provision of Dade County Ordinance 83-92, and on October 19, 1993 the Board removed the word “Authority” from its name.

The principal responsibilities of MDWASD are water transmission, treatment, and distribution; and wastewater collection, treatment, and disposal. MDWASD is one of the largest public utilities in the United States, and currently serves more than 410,000 retail water customers and more than 316,000 retail wastewater customers. In addition, wholesale water service is provided to 15 of Miami-Dade County’s 35 municipalities; wholesale sewer service is provided to 12 municipalities in the County. This represents

retail or wholesale service to more than 2.3 million residents.

The water distribution system of MDWASD is comprised of an estimated 5,556 miles of water main pipes, 1,669 miles of service pipes, with 114,293 water valves and 34,870 fire hydrants in a 437 square-mile area. According to the Comprehensive Master Plan of Miami-Dade County, water is to be delivered to users at a pressure no less than 20 pounds per square inch (psi) and no greater than 100 psi. Pressures are maintained at an average of 55 psi.

MDWASD supplies treated water to most of the municipally-owned water utilities in Miami-Dade County, with the exceptions of the City of Homestead, Florida City and a portion of the Cities of North Miami and North Miami Beach. Florida City and the City of Homestead have their own water treatment plants and serve the populations within their city limits. North Miami Beach and North Miami provide water to a portion of their service areas from their own treatment plants and include certain unincorporated and adjacent incorporated areas. MDWASD provides retail or wholesale wastewater services to practically the entire county.

3.2 WATER USE PERMIT INFORMATION

MDWASD is currently in the application phase for a consolidated Water Use Permit – Application Number 040511-5. The permit application is to allow consumption by MDWASD of water from the Biscayne Aquifer in Miami-Dade County. The requested permit duration is 20 years. The requested average daily allocation is 449.72 million gallons per day (MGD) and the requested maximum monthly allocation is 14,032 MG through and including the year 2025.

3.3 POTABLE WATER USE

The MDWASD water supply system provides water to industry, wholesale distributors and municipal users within the County's boundaries. MDWASD records and analyzes consumption data and reports the data to Miami-Dade County's Department of Environmental Resources Management, the Department of Health and the South Florida Water Management District.

3.3.1 System-wide Historical Water Use

During the last ten years, the total population served by MDWASD has increased by about 16% while total water use has remained relatively constant and per capita use has decreased, as shown in Table 3-1 and Figures 3-1 and 3-2. At the same time, the number of service connections has more than doubled, from approximately 200,000 connections in 1995 to 450,000 in 2005.

Consumptive water use is frequently expressed in gallons per capita per day (GPCD), i.e. average gallons used per person daily. Per capita values shown in Table 3-1, and Figure 3-2 were calculated by dividing the system-wide average day demand by the service area's permanent population. System-wide water use includes residential and non-residential consumption in all of the unincorporated areas and the wholesale member cities. Due to substantial tourism in Miami-Dade County, average per capita water use is higher than it would be if tourism were less significant. That is because there is a significant number of people using water within the service area that are not included in the population, who contribute to per capita demand.

Table 3-1. Historical System-wide Water Use					
Year	Total Population Served*	Total Average Daily Demand (MGD)	Total Annual Use (MG)	Average Month Use (MG)	Per Capita Usage (GPD)
1994	1,842,789	344	125,670	10,472	186.8
1995	1,872,839	341	124,502	10,375	182.1
1996	1,902,889	343	125,232	10,436	180.3
1997	1,932,939	340	124,210	10,351	176.1
1998	1,962,989	344	125,496	10,458	175.2
1999	1,993,039	341	124,569	10,381	171.2
2000	2,023,089	346	126,318	10,526	171.1
2001	2,053,139	321	117,171	9,764	156.4
2002	2,083,190	337	122,908	10,242	161.6
2003	2,113,240	345	125,890	10,491	163.2
2004	2,143,291	346	126,327	10,527	161.5
2005	2,173,341	347	126,655	10,555	159.7

Figure 3-1
Historical System-wide Water Use

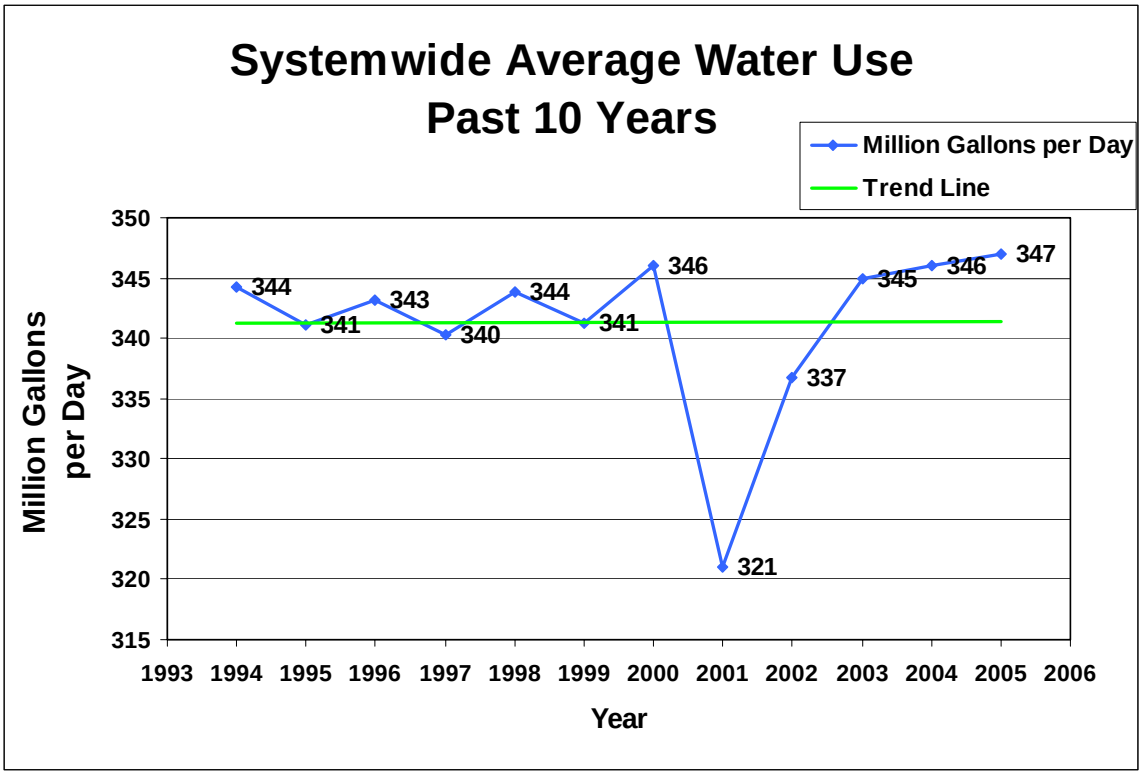
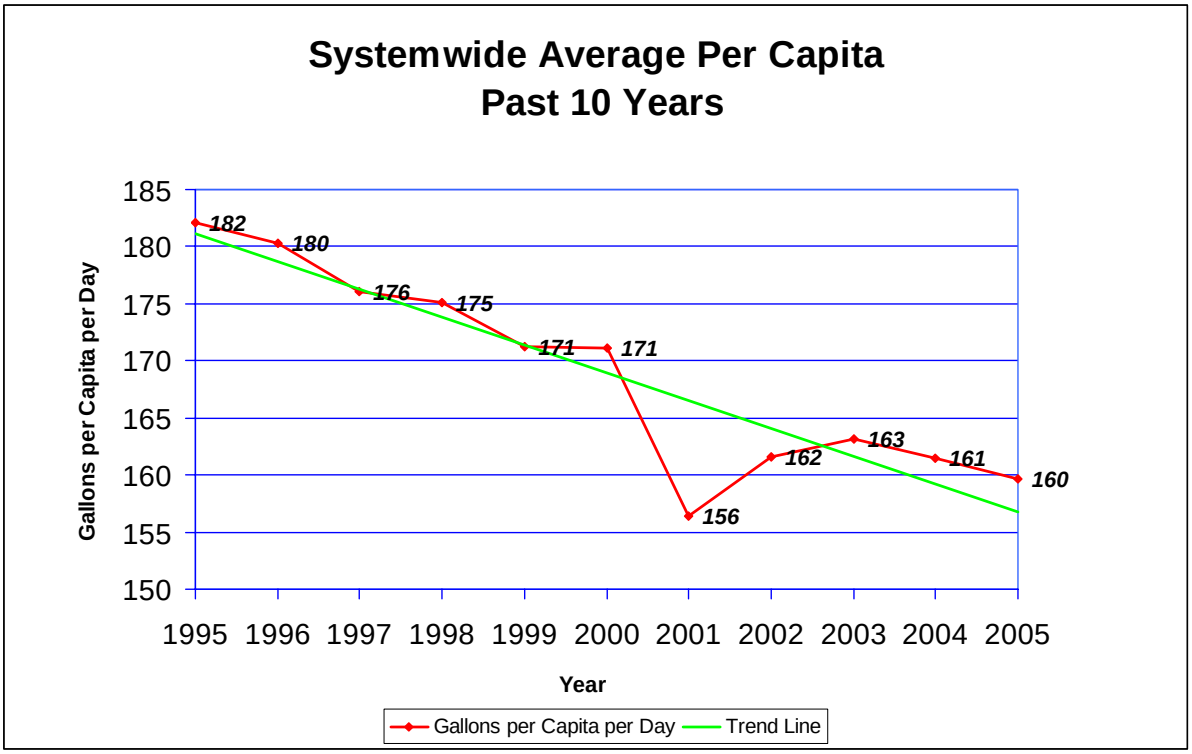


Figure 3-2
Historical System-wide Per Capita Water Use



3.3.2 Historical Wholesale Water Use

The County records and analyzes data on wholesale customers' water use through the billing system. Table 3-2 summarizes the historical water use of wholesale customers.

Table 3-2 Historical Water Use by MDWASD Wholesale Customers									
Customers	Calendar Year								
	1996	1997	1998	1999	2000	2001	2002	2003	2004
Treated Water Delivered to Wholesale Municipality (MG)									
Miami Beach	8,612	8,407	7,901	8,102	8,714	7,853	7,456	7,802	7,994
Hialeah	9,734	9,124	8,989	8,931	8,950	8,384	8,742	8,545	7,730
North Miami Beach	5,230	4,970	5,232	5,232	5,368	4,350	4,411	4,450	4,652
North Miami	2,510	2,117	1,890	2,096	1,917	1,862	1,612	1,536	1,602
Miami Springs	943	863	882	953	918	852	918	906	1,016
Opa-Locka	1,359	1,276	1,253	1,214	1,206	1,030	1,001	954	960
Hialeah Gardens	146	614	690	590	669	741	687	619	655
Medley	492	399	430	630	528	441	434	506	577
Bal Harbour	545	555	550	592	596	522	542	564	552
Bay Harbor Islands	382	371	382	375	382	351	405	415	435
North Bay Village	474	477	475	480	471	450	452	356	375
Surfside	358	353	348	342	341	328	336	349	369
West Miami	343	327	243	267	285	280	292	286	283
Indian Creek Village	156	151	165	158	156	131	138	138	156
Virginia Gardens	113	101	105	55	11	10	8	14	10
Total Wholesale	31,885	31,397	30,102	29,535	30,512	27,585	27,434	27,349	27,366

3.3.3 Retail Customer Classifications

Customer classes differ in their characteristics relevant to water use. Single family (SF) and multi-family (MF) accounts reflect strictly residential water usage. Single family homes typically have irrigated, individually landscaped yards. Government/public water usage is the portion of water used in parks, prisons, government buildings, and along roadways. Other non-residential (NR) accounts are offices, businesses, shops, and restaurants as well as industrial water use in production processes, and ancillary watering of factory grounds.

Residential

Residential water use can be divided into inside and outside water usage. An estimate of outside water use can be obtained by examining monthly water usage. The lowest month recorded will indicate the season in which outside water use for lawn watering, recreation, car washing, etc. is minimal. The amount of water used during this month approximates the amount of water that is used inside the home. Using this approximation with MDWASD data, water use inside a single-family home amounts to approximately 6,000 gallons per month. This equates to about 200 gallons per day per household, or 70 GPCD, using a Miami-Dade County average household size of 2.84 people (U.S. Census Bureau, 2000). Using the estimate of 166 GPCD (average of last five years of per capita data, See Table 3-1), outside water use accounts for almost 40% of SF water use.

Non-Residential

The non-residential classification includes hotels, offices, retail businesses, restaurants, warehouses, light industrial manufacturing, etc. It also includes most government-owned and/or operated facilities.

3.4 RETAIL CUSTOMERS WITH LARGE WATER USE

As a first step in targeting non-residential customers for BMP implementation, it is good practice to identify customers with the highest water use. Typically, large water-users have multiple meters so care should be taken to consolidate multiple meters that are within the footprint of the facility of interest. It is important to recognize that high water use is not necessarily an indication of inefficient water use. A water use evaluation is necessary to determine the customer's actual level of efficiency. Using MDWASD non-residential and government customer billing information, retail customers with the greatest water use have been identified.

MDWASD plans to first address County-owned facilities, a number of County-owned facilities is on the top ten highest users, and will also target federal facilities. U.S.

Department of Energy's Executive Order 13123 (June, 1999) requires federal agencies to develop a plan to meet water and energy conservation goals. In the future, the County will encourage these federal facilities to implement water conservation BMPs developed by the Federal Energy and Management Program (FEMP). MDWASD will include a plan to address their high water use customers, starting with County-owned facilities in the 2007 Annual Plan Report and throughout the 2010 horizon of this Five-year Plan.

3.5 POPULATION AND WATER USE PROJECTIONS

Miami-Dade County is the largest county in Florida with a 2005 population of 2,402,105; MDWASD served 2,173,341 of those residents. Regional growth has held steady at an annual rate of 1.3% since 2001 and it is anticipated that active growth will continue for the next few decades through expansion in out-lying areas and continued development of the urban core.

Population data used to develop projected water demands were obtained from the Miami-Dade County Department of Planning and Zoning. Data for relevant Transportation Analysis Zones (TAZs) were used to determine the total population served within the MDWASD service area. These population projections are being used in SFWMD's Lower East Coast Regional Water Supply Plan update. Water demand projections are based on projected population data using a system-wide per capita use rate of 166 GPD (average per capita from 2001 through 2005). Table 3-3 shows population and demand projections for the MDWASD service area.

Table 3-3. MDWASD System-wide Population and Water Demand Projections		
Year	**Total System-wide Population Served (people)**	**Average Day Demand (MGD)**
2006	2,180,286	361.93
2007	2,209,925	366.85
2008	2,239,564	371.77
2009	2,269,202	378.39
2010	2,298,841	383.37
2015	2,447,888	408.41
2020	2,570,634	429.07
2025	2,693,379	449.72

MGD = million gallons per day

3.6 WATER SUPPLY

MDWASD withdraws water from the Biscayne Aquifer in Miami-Dade County. Table 3-4 includes the well field capacities, requested (WUP Application Number 040511-5) maximum month average withdrawal, and standby capacity. Table 3-5 shows historical treated water volumes. System audit procedures and unaccounted-for water are discussed in Section 4.1.2.

Table 3-4 Water Treatment Plants Capacity and Requested Max Withdrawal			
WTP	**Total 2025 Well Field Capacity (MGD)**	**Requested Max Month Average Day for 2025 (MGD)**	**Calculated Standby Capacity (MGD)**
Hialeah-Preston	384.6	215.8	168.8
Alexander Orr, Jr.	302.2	235.6	66.6
South Miami-Dade	33.1	24.4	8.7
Total System	**719.9**	**475.8**	**244.1**

Table 3-5 Historical Treated Water Volumes										
Category of Use	**Calendar Year**									
	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Volume of Water Treated (rounded to nearest MG)										
Hialeah	60,342	62,071	62,308	61,636	61,074	61,603	60,187	59,953	61,774	64,546
Preston	34,884	33,322	32,675	32,414	33,507	33,207	27,939	29,631	28,453	29,715
Alex Orr	24,589	25,458	25,471	25,920	26,000	26,016	26,317	27,238	30,204	27,555
South Miami – Dade Plants	2,284	2,165	2,116	2,222	2,429	2,439	2,406	2,484	27,238	2,433
Purchased Water	2,164	2,120	1,954	1,972	2,057	2,233	2,136	2,026	2,483	2,000
Total	**124,263**	**125,136**	**124,524**	**124,164**	**125,067**	**125,498**	**118,985**	**121,332**	**125,254**	**126,249**

3.7 COST OF WATER

The cost to MDWASD to withdraw and treat water from the Biscayne Aquifer is approximately $0.9290 per thousand gallons (TG). This cost is compared to the cost per TG to implement the planned BMPs in Section 5.

3.8 RATE STRUCTURE

MDWASD adopted its latest rates October 1, 2005, following a 2004 Rate Study. Details of the current water conservation rate structure are provided in Section 4.2.8. Additional analysis on water conservation rate structure will be performed with the objective that the anticipated cost of the accelerated conservation program will be recover through revised rates. Particularly from customers who fail to respond to the program goals while giving rate relieve to those that respond, thus assuring funding of the program maintaining utility revenues.

3.9 SOCIO-ECONOMIC

The 2000 US Census data lists 398,753 residential dwellings in the service area, of which 302,760 (76%) were built prior to 1985. Of the total number of residential dwellings (362,805), 91% are single family, 23,598 are duplexes, and 12,350 are multi-family. Age of residential dwellings is significant in Water Conservation BMP implementation. Typically, greater water savings are achieved from implementing hardware retrofits and rebates for replacements in structures with fixtures that pre-date 1983 and 1995 plumbing standards.

3.10 CONSERVATION MEASURES AND BMPS CURRENTLY BEING IMPLEMENTED

MDWASD has expended considerable effort over the years implementing numerous water conservation measures. These measures were summarized in Table ES-1. MDWASD will continue to implement these measures and they are therefore included in this Plan (Section 4). However, these measures are largely non-quantifiable. Therefore, in addition to continuing to implement these measures, MDWASD has selected a portfolio of hardware-oriented BMPs which will guarantee quantifiable savings.

Effectiveness of Pre-2006 Water Conservation Measures

Miami-Dade County monitors the effectiveness of ongoing water conservation measures through changes in the per capita consumption rate, which is calculated from the County's Sales and Production Report. Effectiveness of this program is evident by the 22.2 GPCD reduction in the last ten years (1995 through 2005 data, See Table 3-1). Further reduction in per capita is expected to occur through implementation of the BMPs provided in this Plan.

4.0 PLANNING AND IMPLEMENTATION OF WATER CONSERVATION MEASURES AND BMPS

This section includes all non-quantifiable water conservation measures and quantifiable BMPs that are planned for implementation. Table 4-1 lists all measures and BMPs and identifies measures (two Ordinances supporting sustainable design) that are not required or recommended by SFWMD, and are not Conserve Florida default measures. The anticipated effect that the quantifiable BMPs will have on projected water demand is discussed in Section 4.5.

Table 4-1 Portfolio of MDWASD Water Conservation Measures and BMPs	
Section	**Measure/BMP**
4.1	**Operational Measures**
4.1.1	Metering Program
4.1.2	System Audits and Leak Detection/Repair
4.1.3	Distribution System Pressure Control
4.1.4	Recycled Water for Filter Backwashing at Treatment Plants
4.1.5	Water Conservation Coordinator/Manager
4.1.6	Wholesale Water Supplier Assistance Program
4.2	**Policy Measures**
4.2.1	Requirement of Ultra-low Volume Plumbing Fixtures for New Construction
4.2.2	Limitation of Lawn and Ornamental Irrigation Hours
4.2.3	Use of Xeriscape Principles and Rain Sensor Override
4.2.4	Expedited Review and Approval of Building Permit Applications*
4.2.5	Sustainable Development Building Measures for County Buildings*
4.2.6	Long-range Water Conservation Plan
4.2.7	Reuse Feasibility Study
4.2.8	Conservation Rate Structure
4.2.9	Requirements for Water Conservation Planning, Implementation and Reporting by Wholesale Customers*
4.2.10	Proposed review of existing Rules and Regulations
4.2.11	Proposed Retrofit Upon Sale Ordinance
4.2.12	Proposed Mandatory Reuse Area (MRA) Ordinance
4.2.13	Water Remetering Ordinance
4.3	**Educational Measures**
4.3.1	Media Campaigns
4.3.2	Public Information Materials
4.3.3	In-school Programs
4.3.4	Outreach and Public Education
4.3.5	Water Conservation Retrofit Kit Giveaways
4.4	**Quantifiable Best Management Practices**
4.4.1	Non-potable Irrigation Source Replacement or Rebates
4.4.2	Water-efficient Landscape and Irrigation Evaluations and Rebates and Rain Sensor Retrofit
4.4.3	High-Efficiency Clothes Washer Rebates
4.4.4	Ultra Low Flush (ULF) Toilet Rebates/Retrofits
4.4.5	Showerhead Exchange/Retrofit Kit Giveaway
4.4.6	Industrial, Commercial and Institutional Water-Use Evaluations/Implementation • County-owned Facilities (includes leak detection and repair) • Hotel Program

* Not required/recommended by SFWMD and not a Conserve Florida default measure.

4.1 OPERATIONAL MEASURES

4.1.1 Metering Program

4.1.1.1 Source and Finished Water, and Service Connection Metering

All Raw water flows (before entering water treatment plants) and finished water flows (before the distribution system) are metered. All existing service connections are metered and the County requires meters for all new connections.

MDWASD meters all treated water delivered to its wholesale customers. These meters are calibrated semi-annually. The meters are read on a monthly basis for billing purposes and MDWASD monitors meter activity through its Supervisory Control and Data Acquisition (SCADA) system.

4.1.1.2 Meter Reading and Informative Billing

Meters for wholesale and most non-residential customers are read monthly and customers are billed monthly. Non-residential customers that are not billed monthly, are billed quarterly instead. The factor in determining if meter reading occurs monthly or quarterly for the non-residential sector is quantity. Non-residential customers with higher consumption are metered and billed monthly. Most meters for residential customers are read quarterly and they receive a utility bill quarterly. Wholesale deliveries are monitored via a Supervisory Control and Data Acquisition (SCADA) system. Retail customer water bills contain useful information on the relationship between the amount of water used and the cost associated with that use.

4.1.1.3 Meter Testing, Calibrating, Repairing and Replacing

The MDWASD Meter Section is a 24-hour, 365-day operation comprised of various units, performing all functions in respect to the operation and maintenance of water meters. The primary responsibility of the Meter Section is to install, repair, replace, upgrade, and test positive displacement and turbine meters in the field. Additionally, the Meter Section has a facility to test and repair positive displacement meters.

The meter testing and repair/replacement program is administered in coordination with the MDWASD Billing Department which provides a computer-generated meter reading schedule in order to facilitate meter testing within seven days of the meter reading. This seven-day window helps to alleviate customer discrepancies. The billing system stores a history of water usage for each customer. If a meter reading varies more than 200% from the previous consumption period, MDWASD billing system auto-generates a High Bill (a.k.a. HIGH 2) message which triggers a field inspection. Written notification is handed to the customer if they are home during the inspection, or it is placed on their door. The notification identifies the inspector's findings; i.e., a possible leak(s), or an incorrect meter reading (over-read). If the reason for the high water bill is not an over-read, the customer will be offered an indoor water-use evaluation.

MDWASD's standard routine testing and calibration schedule includes:

- Residential meters (5/8-inch to 1-inch positive displacement) are tested every eight years
- Non-residential meters (1.5-inch to 2-inch positive displacement) are tested every four years
- Non-residential meters (3-inch to 10-inch turbine meters) are tested semiannually, or in accordance with the manufacturer's recommendation
- All new meters are tested upon installation
- 2-inch to 4-inch meters are calibrated annually
- Meters greater than 4 inches are calibrated semiannually

4.1.2 System Audits and Leak Detection/Repair

Water audits are performed annually. Historically, American Water Works Association's (AWWA's) method provided in AWWA Manual 36 has been used. However, MDWASD is currently participating in an AWWA Research Foundation (AWWARF) study whereby water audits will be performed using a new and widely accepted standard developed by the International Water Association (IWA). AWWA and Florida's five water management districts will likely adopt this method of calculating water losses. Once the method becomes more integrated into Florida water management district and

utility practices, the term of interest will be called “non-revenue water rather than “unaccounted-for” water. For now, the term unaccounted-for water will be used to remain consistent with current water management district rules and WUP requirements.

Unaccounted-for water is water lost to evaporation from the basins at the treatment plant, leaks in the system, illegal water connections, meter errors and accounting errors. Unaccounted-for water is generally calculated by subtracting water accounted for by the billing system plus authorized un-metered uses from the water leaving the WTPs. Examples of authorized un-metered uses include fire fighting and line flushing (to maintain water quality).

Pursuant to Section 2.6.1(e) of the Basis of Review for Water Use Permit Applications (August 2003), utilities are required to implement leak detection programs if unaccounted-for water losses are greater than 10%. Leak detection programs must include water auditing procedures, field leak detection efforts, and leak repair. Although unaccounted-for water is 12.4%, MDWASD has a very aggressive Leak Detection Program to address these losses. The County also has a tampering monitoring program in place to reduce unauthorized uses which contributes to better water accounting.

MDWASD’s Leak Detection Program is one of the largest efforts of its kind in the nation to reduce losses of water and revenue. The program realized savings of $7.2 million in 2002 by identifying and repairing leaks in water mains and service lines. The national average of unaccounted-for water for the same year was approximately 13%, whereas in Miami-Dade County the unaccounted for water fell well below the national average by 5%. Water saved as a result of repaired leaks in water mains, services, and meters amounts to approximately 30 MGD from 2003 to 2004 alone.

The ongoing program includes an inspection of every section of pipe in its retail service area annually. This system-wide inspection takes a little under a year to complete. Crews use acoustical detection equipment (aqua-scope with an electronic sound amplifier) to locate leaks which are recorded and subsequently repaired. Over the past

five years, three different types of loggers have been added to the program to expedite the survey and "pinpoint" leak processes which are conducted during day and night shifts. A leak location system, or correlator with sonar technology that locates leaks, has been in use since 1993. This system can be used in the daytime and is particularly useful for locating leaks in backyard mains.

The meter Testing and Repair Program described in the previous section helps to reduce unaccounted-for water by ensuring that meters are accurate and that meters are read when the billing system identifies that consumption has greatly increased.

Infiltration and Inflow (I&I) Reduction Program

This program is a recommended SFWMD measure but is not included in the Conserve Florida measures. MDWASD performs sanitary sewer evaluations of more than 15 million feet of gravity collection main lines, resulting in a reduction of more than 147 MGD since 1993. In addition, total annual average daily flows to the water treatment plants were reduced from 325 MGD in 1994 to 290 MGD in 2005.

4.1.3 Distribution System Pressure Control

This is a recommended SFWMD measure and may also be a Conserve Florida default measure for large utilities. For this measure, a water supplier controls pressure to reduce the available water pressure to its customers. This typically takes the form of gradually lowering the pressure while still maintaining the minimum pressure necessary to protect human health, meet regulatory requirements, and to address any utility-specific need. MDWASD uses pressure-reducing valves throughout the distribution system.

4.1.4 Recycled Water for Filter Backwashing at Treatment Plants

This is a recommended SFWMD measure. The measure encourages water utilities using filter systems that are cleaned by backwashing (cleaning the filter by reversing the flow of water) to recycle the backwash water to the head of the treatment plant.

MDWASD uses dual media filters at its three regional water treatment plants (WTPs). These filters require routine backwashing every 40 hours. At all three WTPs, the filter backwash water is recycled to the head of the plant where it is combined with incoming raw water and re-treated. This saves approximately 7 million gallons per day or 2.5 billion gallons per year. An additional 900,000 gallons per day are saved by reclaiming water from the lime sludge produced at the softeners.

4.1.5 Water Conservation Coordinator/Manager

Although SFWMD WUP requirements do not include a Water Conservation Coordinator (or Manager), it is a Conserve Florida default measure for large utilities to have a full-time employee dedicated to water conservation programming and implementation. In May 2005, the County filled the position of Water Conservation Manager to update and enhance its Water Conservation Plan.

4.1.6 Wholesale Water Supplier Assistance Program

MDWASD offers wholesale customers technical assistance in developing their Water Conservation Plans and will provide a copy of this Plan. Through technical assistance, MDWASD will continue to encourage and support efficient water use and water loss reduction within their wholesale service area. The County is currently evaluating an ordinance that requires wholesale customers to develop a goal-based Water Conservation Plan for the County's approval and inclusion in their goal-based Plan annual reports and 5-year Plan updates (Section 4.2.8).

4.2 POLICY MEASURES

Miami-Dade County has enacted ordinances that prescribe mandatory measures such as requiring the installation of ultra low-volume plumbing fixtures, limiting landscape irrigation hours, and requiring the use of Xeriscape landscaping techniques for new development. MDWASD has a conservation-oriented rate structure which is periodically updated. Ordinances already in effect are described in Sections 4.2.1 through 4.2.3. In addition to these existing ordinances, the County is proposing additional legislation

addressing water conservation. The County is currently developing draft language for ordinances to address water conservation planning by wholesale customers, tampering, high-bill investigative procedures, retrofit at time of sale, and mandatory reuse areas.

4.2.1 Requirement of Ultra-low Volume Plumbing Fixtures for New Construction

Miami-Dade County Ordinance 91-15 (adopted February 5, 1991) established water conservation standards for plumbing fixtures installed in new construction and all replacements. Ultra-low volume (ULV) toilets, low-flow showerheads and other water conserving plumbing fixtures are mandatory in all new construction and replacements.

4.2.2 Limitation of Lawn and Ornamental Irrigation Hours

Miami-Dade County Ordinance 91-18 (adopted February 19, 1991) promotes water conservation by establishing permanent irrigation restrictions in accordance with guidelines promulgated by SFWMD. The permanent restriction prohibits landscape irrigation between 9:00 A.M. and 5:00 P.M. due to excessive evaporation rates during those hours. The ordinance also encourages efficient water use by not restricting hours for low-volume irrigation methods or irrigation with treated wastewater effluent (reclaimed water).

4.2.3 Use of Xeriscape Principles and Rain Sensor Override

The Miami-Dade County Landscape Ordinance 95-222 (approved December 5, 1995) requires the use of Xeriscape principles for new construction through use of drought-tolerant landscape species, grouping of plant material by water requirements, the use of irrigation systems that conserve potable and non-potable water supplies and restrict the amount of irrigated turf areas. The Landscape Ordinance also requires all irrigation systems equipped with automatic controls to have a rain sensor switch which turns off the system when more than 0.5 inches of rain have fallen.

4.2.4 Expedited Review and Approval of Building Permit Applications

Miami-Dade County Ordinance 05-115 amends Chapter 8 creating a new section 8-8 that promotes sensitive design and construction. The ordinance provides for an expedited

review and approval of permit applications for "green" buildings. A green building is a building whose design, construction, and operation promotes the preservation of resources and environmentally sensitive construction practices, systems and materials. In determining whether the structure is a green building, the Building Official will rely on the review, evaluation and where available, registration or certification of the design by recognized environmental rating agencies including the Florida Green Building Coalition, the National Home Builder association and the U.S. Green Building Council.

4.2.5 Sustainable Development Building Measures for County Buildings

Miami-Dade County Resolution R-1200-05 incorporates sustainable development building measures into the design, construction, renovation and maintenance of County-owned, County-financed and County-operated buildings as a policy of Miami-Dade. The resolution directs the County Manager to prepare a plan for the implementation of the policy that includes a timetable for implementation, adoption of a well-recognized Green Building standard such as the US Green Building Council's Leadership in Energy and Environmental Design (LEED) rating.

4.2.6 Long-range Water Conservation Plan

Miami-Dade County Resolution R-1271-05 directs the County Manager to develop a County Water Conservation Plan that addresses the following:

- Applying more stringent water conservation requirements to County-owned facilities (leading by example)
- Involving other communities and water users in the conservation effort and support
- Evaluating existing land use planning and zoning laws affecting water use and revising them as necessary to be consistent with the conservation strategy
- Evaluating existing State legislation or Federal policy to incorporate additional water conservation measures
- Developing a water conservation plan that is sensitive to low-income residents and the elderly on a fixed income
- Developing and implementing additional water conservation projects

4.2.7 Reuse Feasibility Study

Miami-Dade County Resolution R-1382-05 directs the County Manager to conduct a Reuse Feasibility Study by September 2006. The ongoing study is further discussed in Section 4.4.1.

4.2.8 Conservation Rate Structure

Since 1990, MDWASD has had a tiered schedule of water rates to encourage conservation. Following a 2004 Rate Study, MDWASD adopted its latest rates October 1, 2005 (Table 4-1). Retail water rates contain two components: a fixed charge dependent on meter size (or number of units for multi-family residential), and a variable charge which the County refers to as a "flow rate". MDWASD's rate structure, an inclining block rate, encourages water conservation and efficient water use among retail customers by charging more per unit of water as more water is used..

Table 4-2
MDWASD Tiered Water Rate Structure for all Retail Customers
(Effective October 1, 2005)

Amount of Monthly Water Use (Gallons)	Charge per 1,000 Gallons
0 to 3,750	$0.50
3,751 to 7,500	$1.76
7,501 to12,750	$2.48
over 12,750	$3.66

Retail wastewater rates are similarly structured, with a fixed facility charge and a conservation-oriented flow rate so that higher rates of consumption are charged more for each unit of flow. Wastewater connections are not metered and wastewater charges are based on metered potable water use, using an inclining block rate. This further encourages conservation as a customer who implements water conservation measures will save money on both water and wastewater charges.

4.2.9 Requirements for Water Conservation Planning, Implementation, and Reporting by Wholesale Customers

MDWASD has existing contracts with their wholesale customers; these contracts contain language relating to water conservation, most particularly in drought situations. The essence of the agreement is that if there is a shortage in the supply of water, wholesale customers will curtail their usage to the same extent as MDWASD. At this time, there are no specific conservation requirements beyond the drought scenario. However, MDWASD is currently proposing language to amend Miami-Dade County Ordinance 85-95 to require wholesale customers to create Water Conservation Plans under the Conserve Florida Program. The wholesale customers would be required to develop their Plan using the web-based tool being developed by Conserve Florida. Use of this tool will be required because it allows wholesale agencies (and water supply authorities) to consolidate the Water Conservation Plans of their wholesale customers (or utility members) and combine them with their Plan or Annual Report before submitting it to their water management district. This is a strategic advancement in water conservation effectiveness because historically, wholesale agencies (and water supply authorities) have typically been ultimately responsible for the implementation of water conservation measures and BMPs and general demand management that are required by their WUP. Yet these wholesalers usually have no authority to require their wholesale customers to help them to meet demand management goals. The proposed amendment language is as follows:

”Based on newly-enacted legislation, wholesale customers shall comply with requirements of the Florida Department of Environmental Protection and the South Florida Water Management District as indicated by MDWASD. A goal-based Water Conservation Plan shall be submitted to MDWASD by December 29, 2006; said plan shall be updated for the County’s approval every five years and annual reports shall be filed with MDWASD within two months following the previous year’s implementation.”

4.2.10 Proposed Review of Existing Rules and Regulations

A Review of Miami-Dade County Code, Section 32-121: Tampering with Utility Fixtures is being recommended. The intention of the proposed review is to identify possible enforcement enhancement. The review of the rules and regulations related to the investigative procedures of retail customers' high bills is also recommended.

4.2.11 Proposed "Retrofit upon Sale" Ordinance

This is a proposed ordinance that establishes water conservation standards regarding implementation of a plumbing retrofit program and procedure upon the change of ownership of real property. This ordinance requires installation of ultra-low-flush (ULF) toilets and low-flow showerheads and faucets at time of sale. This requirement will apply only to homes built prior to 1994. This measure offers potential water savings of over one million gallons per year. Property sales figures for single family homes for 2005 in Miami-Dade show over 18,000 single family homes built prior to 1994.

4.2.12 Proposed Mandatory Reuse Area (MRA) Ordinance

This proposed ordinance will set the standards for the provision of reclaimed water services within certain MDWASD service areas. The service areas will be identified in the Reuse Feasibility Study (see Section 4.4.1). This ordinance will establish Mandatory Reclaimed Water Service Areas for mandatory connection of new developments within a limited geographical radius where reclaimed water is available. The MRA will enable the County to be in compliance with Federal and State laws, rules, and regulations pertaining to reclaimed water.

4.2.13 Water Remetering Ordinance

Miami-Dade County Water Remetering Ordinance No. 97-69 (adopted June 3, 1997) permits remetering to encourage conservation of water resources. The ordinance establishes a comprehensive regulatory system to assure that the practice of remetering of water services and billing are just and reasonable, and assures that billing for water service at multiple-unit properties is based on individual unit usage.

4.3 EDUCATIONAL MEASURES

MDWASD customers are informed of the need to conserve water and available methods for conserving water are conveyed to the public through educational programs. Water conservation public education programs are implemented by the Public Affairs Section of MDWASD. The five approaches of the educational programs are media campaigns, public information materials, in-school programs, outreach and public exhibitions, and retrofit kit giveaways.

4.3.1 Media Campaigns

MDWASD spends more than $100,000 per year to conduct a multi-tiered media campaign. Local radio, TV and newspaper advertisements are utilized to promote MDWASD's water conservation efforts. MDWASD also uses a variety of communication methods provided by the County, including water conservation messages on Miami-Dade Transit Department buses and public service announcements on Miami-Dade Television.

4.3.2 Public Information Materials

MDWASD purchases and publishes a variety of brochures and other literature promoting water conservation. These materials are available in both English and Spanish to members of the public upon request and are also distributed to the public through presentations. Brochures provide information on water conservation issues such as Xeriscaping, how conserving water saves money, and simple water conservation tips. MDWASD also maintains a 24-hour automated phone line and web site that provides the public with water conservation information. MDWASD has received much recognition for its public information efforts, including the National Association of Counties' Superior Award in 2005 for the customer information booklet, "All You Need to Know."

Details about the MDWASD's current and proposed water conservation public information materials, conservation phone line and website are provided below.

Water Bill Insert/Customer Newsletter: "Pipeline" - Distributed with customer bills on a quarterly basis, this publication often provides water conservation tips. Customers also receive an annual water quality report with their bill. All of these publications are produced in both English and Spanish. This brochure is consistent with the Conserve Florida "water bill insert" measure.

Employee Newsletter: "Splash" - Water conservation information is included in this bi-monthly employee newsletter as well.

Customer Information Booklet: "All You Need to Know" – Distributed to new customers as a guide to MDWASD's services, a section of the booklet is dedicated to water conservation.

Customer Information Pamphlet: "Saving Water at Home" - Informational brochure about water conservation practices in the home.

Florida Section of the American Water Works Association Newsletter – MDWASD produces the membership newsletter which includes water conservation information on a regular basis.

WATERLINE – A 24-hour automated phone line (305-448-SAVE) provides water conservation tips including Xeriscape principles, information on water conservation ordinances and incentive programs that are in effect. Callers can request a free water conservation kit by leaving their name and address on the voice messaging system. A separate number has also been established to provide information regarding the low-flow showerhead exchange program.

MDWASD Website – The MDWASD website features a "Save Money and Water" link. This link includes information on water conservation tips for inside and outside the home. Other website pages include: "Water Conservation," "Low Flow Showerhead Exchange Program," "Miami-Dade County Permanent Water Restrictions," "Order a Water

Conservation Kit," "Don't Landscape – Xeriscape," "Lower Your Water Bill," and "Drop Savers" Poster Contest Winners." This website will be restructured to include additional informational and educational features such as a water saver calculator. All information will be available in English and Spanish.

Informative Billing - It is important for MDWASD to clearly communicate with its customers. To that end, a review of the current water bill format will be conducted. The goal is to provide informative detailed monthly statements that help our customers to better understand their water use and how they are charged for it. The feasibility of providing the water bill in the customer's preferred language, will also be evaluated.

4.3.3 In-school Programs

The in-school program is a curriculum-based program that targets young water consumers who will hopefully retain a water-conservation ethic into their adult lives. Children have direct contact with their parents and may have a better opportunity to influence their parent's behavior than traditional advertising campaigns. Schools that draw from public housing developments that will receive water use evaluations and retrofits (see Section 4.4) will be targeted to provide a link between what the students learn in school and what they will experience with the retrofits occurring in their buildings. Additionally, MDWASD provides grant funding to community organizations that focus on environmental education of children. These approaches will increase the effectiveness of both programs by providing continuity.

In-School Presentations – School presentations are made every year by the MDWASD Public Affairs Section upon request. Child-targeted curriculum-based outreach materials include international videos, coloring and activity books and other age-appropriate materials promoting water conservation.

Curriculum-Based K-12 In-School Project – MDWASD is the local sponsor for "WET in the City," an urban environmental education program of the Council for Environmental

Education (CEE) that focuses on protecting and conserving water resources. This project seeks to advance water education and environmental stewardship among urban youth.

"Drop Savers" Poster Contest – MDWASD is the local sponsor for the annual statewide water conservation poster contest, "Drop Savers." Sponsored by the Florida Section of the American Water Works Association (FSWWA), this program introduces water conservation to students from kindergarten through 12th grade. MDWASD provides the schools with the necessary materials for children's participation. Winners from five grade levels are chosen locally. The local winners then go on to represent Miami-Dade County at the State level competition. The winning poster of the State competition is illustrated on a T-shirt. MDWASD has participated in this program since 1995, and recognizes five students from the Miami-Dade County Public Schools each year.

Community Based Organizations (CBO) Grant Funding – Each year, MDWASD contributes $250,000 towards a countywide fund of more than $500,000, created for the purpose of providing grant money to CBOs that provide environmental education to children. Traditionally applicants have included the topic of water conservation in their proposals. As part of the new measures CBO's applying for this funding will be asked to address the projects identified in the Plan when preparing their proposals. The Department intents to use this process to assist in the accomplishment of the education and public outreach goals identified in the Plan.

4.3.4 Outreach and Public Exhibitions

MDWASD is highly visible at many public events and often distributes literature and other promotional items. The display includes information about the Low-Flow Showerhead Program and various eye-catching promotional items such as stickers, pencils, pens, erasers and rulers. Staff also participate in presentations at County Commissioner District meetings and outreach sessions coordinated by Team Metro and various other departments and community organizations.

Team Metro Presentations –These monthly evening meetings that occur throughout the County provide an opportunity for residents to obtain information about services offered by the County. MDWASD presentations include information on water conservation.

Commissioner-Sponsored Events – These evening meetings coordinated by Commissioners for their District constituents provide an opportunity for residents to learn about County services. Among other topics, MDWASD's presentations include information on water conservation.

Community Group Meetings – MDWASD attends meetings hosted by a wide variety of community groups, including professional organizations, neighborhood and special interest groups, and homeowners' and condominium associations. Presentations include water conservation information.

4.3.5 Water Conservation Retrofit Kit Giveaways

Water conservation is promoted by providing retrofit kits to the public upon request. Historically, MDWASD has not verified that the recipient is a MDWASD customer or tracked water savings through customer billing accounts. However, recipients will be verified and water savings will be tracked from 2006 and beyond. Since accounts will be tracked before and after retrofit, this measure is identified as a quantifiable BMP in Section 4.4. The retrofit kit giveaway and showerhead exchange programs are discussed below.

Retrofit Kit Giveaways – These kits include a water flow restrictor for the showerhead, the "Incredible Bowl Saver" which reduces the amount of water used by toilets, dye-tracing tablets that detect leaks in toilets, and an aerator for the sink faucet. The kits are distributed at public events, and to Condominium Associations and customers upon request. Approximately 5,000 kits are distributed annually. After kits that are already stocked in-house have all been distributed; different kits that include a showerhead instead of a flow restrictor will be procured.

Showerhead Exchange – MDWASD has a Low-Flow Showerhead Exchange Program whereby customers exchange their original showerheads for a low-flow model provided by MDWASD. A total of 15,000 showerheads were acquired for the program's initial phase. A kick off event took place August 13, 2005 where more than 400 showerheads were exchanged. Upon receipt of the new showerhead, the customer provided their address and account number so that the customers could be verified and accounts tracked.

4.4 QUANTIFIABLE CONSERVATION BMPS

Historically, the water conservation measures required by SFWMD as a condition to their WUPs are not quantifiable. MDWASD has historically implemented all measures required by the District (see Table 3-2). The District is actively participating in the Conserve Florida group, which is currently developing a system of default and optional measures and best management practices (BMPs). The Conserve Florida BMPs have quantifiable costs and water savings, and are hardware-oriented rather than education- or policy-oriented.

MDWASD will continue to implement the SFWMD required measures and will also implement quantifiable BMPS in addition to those measures as provided in this goal-based Plan. The savings and cost effectiveness of BMPs presented in this section are only those associated with BMPs MDWASD is implementing above and beyond what the District currently requiresw.

The Conserve Florida group is currently under contract with a consultant who is building a web-based Water Conservation Guidance Document. The web-based tool has a host of default measures and BMPs. All BMPs in the web-based tool are quantifiable and many have default savings rates. Default savings rates that have been agreed upon by the Conserve Florida group are applied to this Water Conservation Plan where applicable. There are cases where MDWASD's implementation strategy warrants the use of savings rates that are different from the Conserve Florida Guidance Document. For clarity, the savings rates recommended for MDWASD are discussed for each BMP.

Table 4-3 is a summary of the quantifiable water conservation BMPs, and their cost and savings rates. Full details are provided in Appendix A.

Table 4-3 BMP Summary									
MDWASD BMP	Category	Sector	Cost/ measure[7]	Savings Rate (gallons per meas. per day)	Number of Measures				
					2006	2007	2008	2009	2010
Water-Efficient Landscape and Irrigation Evaluations and Rebates with Rain Sensor Retrofit	Landscape & Irrigation Evaluations plus Rain Sensor Retrofit (without Rebate)[1]	SF	$260	233	100	50	50	50	50
		NR – County-owned (~25 irrigated acres)	$8,010	35,000	0	20	20	20	20
	Landscape & Irrigation Evaluations plus Rain Sensor Retrofit (with Rebate)[2]	SF	$815	233	0	50	50	50	50
High-Efficiency Clothes Washer Rebate	Common-area Washers	MF	$300	48	0	50	50	50	50
Ultra Low Flush (ULF) Toilet Retrofit/Rebate	Retrofit (includes showerhead and aerators)[3]	SF - Elderly	$250	57	750	2,100	2,500	2,700	3,000
		County-owned MF Housing	$0	57	0	1,000	1,000	1,000	1,000
	Rebate (toilet only)[4]	SF	$130	22	750	750	750	750	750
Showerhead Exchange	No Categories	SF	$1.60	35	3200	3200	3200	3200	3200
Retrofit Kit Giveaway	No Categories	SF	$2.38	12	3200	3200	3200	3200	3200

Table 4-3 BMP Summary									
MDWASD BMP	**Category**	**Sector**	**Cost/ measure[7]**	**Savings Rate (gallons per meas. per day)**	**Number of Measures**				
					2006	**2007**	**2008**	**2009**	**2010**
Industrial, Commercial and Institutional Water Use Evaluation/ Implementation	Leak Detection and Repair of County-owned Facilities	NR	$4,740	1,000	50	0	0	0	0
	Evaluate and Retrofit County-owned Facilities (not MF Housing Developments)[5]	NR	$1,600	1,500	22	10	10	10	10
	Hotel Program[6]	NR	$0	1,617	12	12	12	12	12

gpmd - gallons per measure (i.e., toilet, clothes washer) per day

GPD = gallons per day

Notes

Throughout Plan, costs do not include County staff labor.

[1] Cost includes labor to perform evaluation, install a rain sensor ($65/sensor), and provide a report ($300).

[2] Cost includes labor to perform evaluation, install a rain sensor, and provide a report ($300); plus a $50 rebate to the customer, and $30/rebate to outsource rebate processing.

[3] Cost and savings include 1 toilet, 1 showerhead, and 2 aerators (1 for the bathroom; one for the kitchen), and installation costs.

[4] Cost includes a $100 rebate to the customer and $30/rebate to outsource rebate processing.

[5] Cost is only for intradepartmental assistance from WASD to other County departments for retrofit. Assistance may be in the form of a rebate or water bill credit.

[6] Savings shown are for a hotel with 50 to 100 rooms (Southwest Florida Water Management District Water Conservation Hotel and Motel Program).

[7] Costs include equipment and outsourcing; costs do not include County staff time.

4.4.1 Non-Potable Irrigation Source Replacement or Rebates

SFWMD requires utilities that control a wastewater treatment plant to perform an analysis of the economic, environmental and technical feasibility of making reclaimed water available. It is anticipated that the Conserve Florida program will require reclaimed water projects to offset potable demand. As discussed below, MDWASD is currently performing a reclaimed water feasibility study in addition to continued implementation of existing reuse projects and commitments to expand the reuse program.

Existing Reuse Projects

A total of 16 MGD of treated wastewater is currently used at the North, Central and South District plants for process water and landscape irrigation. The remainder of the effluent is disposed of through Atlantic Ocean outfalls (North and Central Districts) and deep well injection (South District).

A water conservation pilot project is in place as a partnership between MDWASD and Florida International University (FIU) North Campus. Treated wastewater effluent from the North District plant is distributed to FIU where it is used for landscape irrigation. This conservation project saves nearly 36.5 million gallons of fresh drinking water annually, (more than 100,000 gallons per day) that would otherwise have been used for landscape irrigation.

Ongoing Reuse Study and Implementation

MDWASD conducted a Reuse and Recycling of Wastewater and Greywater Feasibility Study in 1998 and is currently updating its findings. MDWASD intends to implement feasible reclaimed water projects identified in the study that are approved by the Board of County Commissioners. The Reuse Feasibility Study will be completed by July 2006. After projects have been identified, MDWASD will submit a detailed plan and implementation schedule to the District and the FDEP.

The study includes the feasibility of retrofitting existing accounts with a reclaimed water connection and requiring new developments to include a dual-water system (called

Mandatory Reclaimed Water Service Areas) so that reclaimed water can be delivered when MDWASD infrastructure is in place.

Potential satellite reuse projects are also being evaluated in the study. Satellite reuse involves taking raw wastewater from the sanitary sewer at particular locations in the system and treating the water to reclaimed water standards. These projects target large users that could greatly offset their potable water demand by using non-potable water for irrigation, cooling equipment, and other non-potable uses. For these potential projects, raw wastewater would be mined from the sewer system in the vicinity of the facility of interest and treated on or near the site of reuse.

Through a Consent Order (CO) with the FDEP, MDWASD has committed that the next County WWTP expansion, which is planned for the 2013 – 2016 timeframe at the South District Wastewater Treatment Plant (SDWWTP), will use reclaimed water as the effluent disposal method. This project alone amounts to 18.75 MGD of beneficial use.

MDWASD will implement at least another 17.72 MGD of reuse by the end of the requested 20-year Water Use Permit duration. This amounts to a commitment of 36.47 MGD, which is the amount that MDWASD is currently requesting that SFWMD provide as additional allocation.

Furthermore, through the County's commitment as the local sponsor of the CERP South Miami-Dade Reuse Project, two wastewater reuse facilities to be implemented in Miami-Dade County are included in the Comprehensive Everglades Restoration Project (CERP) planning documents. Through the County's participation in CERP, it is anticipated that by the year 2050, the West Miami-Dade Reuse Facility will provide 100 MGD of reuse, and the South Miami-Dade Reuse System will provide 131 MGD of reuse.

Implementation Strategy and Schedule

The final draft of the report will be completed in April 2006. Projects recommended in the report will be proposed to the Board of County Commissioners for approval and

potential inclusion in the multi-year capital plan. It is anticipated that implementation of new reclaimed water projects will begin September 2007 and continue through the requested 20-year WUP duration.

4.4.2 Water-Efficient Landscape and Irrigation Evaluations/Rebates and Rain Sensor Retrofit

SFWMD recommends (as an "optional" water conservation measure) that utilities implement an irrigation and landscape audit. It is anticipated that the Conserve Florida program will require landscape and irrigation evaluations be provided to utility customers with or without rebates. MDWASD will supplement this BMP with a rain-sensor retrofit to achieve higher savings.

Landscape audits are measures that improve the efficiency of irrigation systems, and include services to determine if the irrigation system is operating properly. Landscape retrofit measures provide information and incentives for users to implement physical changes to their landscape and irrigation systems. Devices suitable for irrigation system retrofits include those that prevent unnecessary irrigation by detecting recent rainfall (called a rain sensor) or sensing soil moisture. Other retrofit options include repairing broken irrigation equipment that results in the wasteful use of water, replacing outdated and/or broken irrigation equipment with more efficient equipment, rezoning the automatic irrigation system so that landscape beds and turf are on separate zones, replacing existing landscaping with site appropriate plants and providing adequate mulch thickness to retain moisture.

Implementation Strategy

There are several organizations that assist homeowners reduce outdoor irrigation by performing audits to evaluate the potential for saving water. Another option is to use County staff. Regardless of who performs the irrigation audits, utilities may provide rebates for homeowners to implement recommended irrigation or landscape changes. MDWASD will provide rebates to approximately half of the SF homes that will be evaluated.

The following list of organizations, contractors, etc., could provide the irrigation evaluations:

(1) Florida Yards & Neighborhoods (FYN), a statewide urban horticulture educational and outreach program cosponsored by the University of Florida's Institute of Food and Agricultural Sciences (IFAS) and the Miami Dade County Cooperative Extension Service.

(2) Mobile irrigation laboratories (MILs), which is a program maintained by a partnership between the SFWMD, the U.S. Department of Agriculture's Natural Resources Conservation Service (USDA–NRCS), the Florida Department of Agriculture and Consumer Services (FDACS) and various soil and water conservation districts. An urban MIL typically performs 140 evaluations per year.

(3) Irrigation contractors that are Florida Irrigation Society (FIS) certified Irrigation Auditors.

(4) County-employed (full-time or part-time) individual.

MDWASD will use one of the four mentioned implementation options and couple the program with a rain sensor retrofit program. Home and facility owners will be advised that all irrigation systems equipped with automatic controls must have a rain sensor switch which turns off the system when more than 0.5 inches of rain have fallen (Miami-Dade County Landscape Ordinance No. 95-222, December 5, 1995). The home and facility owners will receive a free rain sensor for electing to participate in the evaluation. During the evaluations, rain sensors will be installed and wired into the irrigation system control panel.

After recommendations are provided to the home and facility owners, rebates will be provided for the modification of irrigation equipment that is consistent with audit recommendations; however, rebates for changing landscape will not be provided during the 5-year implementation duration set forth in this Plan.

Implementation Schedule

	Irrigation Evaluations with Rain Sensor Retrofit		Irrigation Rebates	
	Single Family	Non-residential	Single Family	Non-residential
Implementation Schedule	100 audits per year from 2006 - 2010	20 audits per year from 2007 - 2010	50 rebates per year from 2007 - 2010	Not planned

Implementation Costs

Through discussions with SFWMD staff, the cost to outsource an audit and rain sensor installation to a MIL is approximately $260 per single-family residence, which includes the cost of rain sensor equipment and installation. The cost for the non-residential sector was estimated to be $8,010 for a 25-acre parcel, such as a County-owned park or athletic facility.

It is anticipated that $50 rebates will be provided to homeowners who implement modifications to their irrigation system. If the rebate processing is outsourced, the cost would be approximately an additional $30 per rebate resulting in a total cost to MDWASD of $80 per rebate.

Water Savings Rate

SFWMD has collected MIL water savings data for five regional MILs over a 13-year period. The savings reported by SFWMD is 1,400 gallons per day per acre of irrigated space. Assuming an average irrigated area of 1/6 acre for SF homes in the Miami-Dade retail service area, the savings rate would be 233 gpd per SF home. Using the same SFWMD per-acre savings rate, evaluation of a 25-acre parcel would lead to 35,000 gpd

per parcel. These estimate were developed in coordination with SFWMD staff and the District intends to use these estimated savings rates in their Lower East Coast Regional Water Supply Plan.

Since MIL evaluations include the recommendation of installing a rain sensor if one is not present, no additional water savings are included in the estimate. However, the installation of a rain sensor as part of the evaluation will help to secure the estimated savings. SF lots that belong to customers that do not implement recommendations provided in the irrigation evaluation report, will achieve, at a minimum, significant savings from the rain sensor device.

4.4.3 High-Efficiency Clothes Washer Rebate

SFWMD does not require or specifically recommend retrofitting or providing rebates for replacing older, less-efficient clothes washers with newer, more efficient washers. However, it is anticipated that this BMP will be included as a Conserve Florida default BMP for coin-operated laundries and/or multi-family buildings where tenants use a common clothes washing area.

Implementation Strategy

MDWASD will provide a rebate to Multi-family customers with a common-area laundry for retrofitting high water-use clothes washers with high-efficiency clothes washers. Information such as water billing data and the number of units and residents will first be evaluated to determine which buildings have the greatest water savings potential. MDWASD is discussing the possibility of creating a partnership with Florida Power and Light to implement this BMP.

Implementation Schedule

Data will be evaluated in 2006 and replacement rebates will begin in 2007 with 50 washers per year rebated from 2007 through 2010.

Implementation Cost

The cost of this BMP is $300 and includes the cost of the rebate only. Rebate processing will not be outsourced as this will be a transfer of funds (as a rebate or as a water bill credit) between County departments. MDWASD will work with the Housing Authority to explore potential Federal funding to support BMP implementation costs.

Water Savings Rate

A savings rate of 48 gallons per day per washing machine rebated is assumed (California Water Conservation Council).

4.4.4 Ultra Low Flush (ULF) Toilet Retrofit/Rebate

The District's water use permit regulations specify that toilets have a maximum flush volume of 1.6 gal/flush (gpf) when the water pressure is 80 pounds per square inch (psi). The District's regulations are consistent with the maximum water use allowed for toilets under the U.S. Energy Policy Act of 1992 (EPAct), which became effective on January 1, 1994, and required manufacturers to produce water-conserving plumbing fixtures (i.e., ULF toilets and urinals, low-flow showerheads, and low-flow faucets and aerators). The requirement also conforms to current Building Construction Standards (Chapter 553, F.S.). The previous standard for toilets (September 1983) was 3.5 gpf.

Toilet rebate/retrofit programs typically target pre-1995 accounts because of the 1995 EPAct regulations. However, targeting pre-1983 homes can increase potential savings because prior to 1983, toilets could use more than 3.5 gpf. Miami-Dade County has identified the following pre-1985 accounts within its retail service area. Due to census data limitations, it is typical for utilities wishing to target pre-1983 accounts to select pre-1985 homes.

	Double Exempted Single Family Homes	Single Family Homes (not double exempted)	Public Housing Units
Number of Pre-1985 homes or units	24,088	268,940	11,000

Implementation Strategy and Schedule

An Additional Homestead Exemption for senior citizens is provided by Miami-Dade County as authorized by Section 196.075, Florida Statutes. The law allows both counties and municipalities, through adoption of an ordinance, to each grant an additional homestead tax exemption of up to $25,000 to resident homeowners who have legal or equitable title to the real estate, who are at least 65 years of age on January 1 of the year for which the application for exemption is made and whose annual household adjusted gross income for the prior year did not exceed $20,000. The law defines the terms "household" and "household income" and provides for a cost of-living increase for the income limitation beginning January 1, 2001. Residents that meet these criteria are considered to be “double exempted.”

Double-exempted single-family homes will receive a water-use evaluation prior to retrofitting the homes. Toilet retrofits will be coupled with a retrofit of showerheads and aerators for the double-exempted homes and public housing units. The single family rebate program will include a rebate only; however, these customers can participate in the showerhead exchange and/or the retrofit kit giveaway at anytime.

	Double Exempted Single Family Homes	Single Family Homes (not double exempted)	Public Housing Units
Implemented as a Rebate or Retrofit Program	Retrofit of toilet, showerhead, and aerators	Rebate	Retrofit of toilet, showerhead, and aerators
Number of accounts or units to be retrofitted or rebated	750 to 3,000/yr from 2006 through 2010	750/yr from 2006 through 2010	1,000/yr from 2007 through 2010

Implementation Costs

The retrofit program includes the cost of the hardware (1 toilet, 1 showerhead, and two aerators) and installation which is estimated to be $250 for the SF sector installations. The cost of the SF rebate program is the cost of the rebate ($100) plus the cost to outsource rebate processing ($30). The County Housing Agency is working with HUD to secure funding to implement retrofits in County-owned MF housing developments.

Water Savings Rates

Savings rates for the retrofit programs include the savings obtained by the toilet and showerhead retrofits. Savings rates are 22 for the toilet (SFWMD) and 35 for the showerhead (SFWMD) for a total of 57 gallons per retrofit per day. The rebate program will include only the toilet savings of 27 gpmd.

4.4.5 Shower Head Exchange/ Retrofit Kit Giveaway

The District's water use permit regulations specify that showerheads and faucets have a maximum flow rate of 2.5 gallons per minute (gpm), and 2.2 gpm, respectively. The District's regulations are consistent with the maximum water use allowed for showerheads and faucet aerators under the 1992 U.S. Energy and Policy Act (EPAct), which became effective January 1, 2004, and conform to current Building Construction Standards (Chapter 553, F.S.). The previous standard for showerheads and faucet aerators was 3.0 gpm, and 2.5 gpm, respectively.

A conservation retrofit kit program is recommended by SFWMD as a supplemental (not required) measure for urban water users. Retrofit kit giveaways are a default educational measure for large utilities under the Conserve Florida Program. The reason the Conserve Florida program lists this as an educational measure rather than a quantifiable BMP is because many utilities give away showerheads and kits without tracking installation. However, if a utility tracks affected accounts, the Conserve Florida program allows the utility to include the water savings in their total savings.

Implementation Strategy

MDWASD will implement this measure as a quantifiable BMP in the SF and MF sectors. New showerheads will be provided to customers upon receipt of their old showerhead and service address. It is reasonable to assume that the conserving showerhead will be installed when the customer has provided their old showerhead in exchange for the new showerhead. Before and after water use will be tracked via customer billing.

Retrofit kits currently include the Incredible Bowl Saver® which reduces the amount of water used by toilets, dye-tracing tablets that detect leaks in toilets, and a faucet aerator. The affected accounts will be tracked because customers will be required to provide their service address upon receipt of a kit.

Implementation Schedule

From 2006 through 2010, approximately 3,200 showerheads, and 3,200 conservation kits will be provided to customers each year.

Implementation Costs

MDWASD currently pays $1.60 per showerhead and $2.38 per retrofit kit.

Water Savings Rate

The savings rates for showerheads and retrofit kits are 35 gpd/showerhead (SFWMD); and 12 gpd/kit (a conservative savings rate based on a range of savings reported by utilities in the Tampa Bay region).

4.4.6 Industrial, Commercial and Institutional Water-Use Evaluations/ Implementation

SFWMD does not specifically require the implementation of a BMP that targets the industrial, commercial and institutional (ICI) sector; however, the Conserve Florida Program includes this BMP as a default BMP for large utilities. MDWASD plans to target two ICI customer groups in the retail service area – County-owned (and/or operated) facilities, and privately-owned hotels.

This BMP provides water-use evaluations to ICI (or non-residential customers). In some cases, the evaluations are followed up with rebates and/or retrofits. When rebates/retrofits are applied, it is important to segregate the costs and savings from other BMPs. For example, a water use evaluation may result in retrofitting toilets and showerheads. In this case, the costs and savings should not be counted twice when calculating total costs and savings of the overall water conservation program. One way

to accomplish this is to tag costs and savings for the retrofits that are in response to an ICI effort and to tag ICI recommendations as having an applicable rebate or retrofit option.

For this Plan, MDWASD will provide Landscape and Irrigation Evaluations (with rain sensor retrofit) for County-owned facilities through the Landscape and Irrigation Evaluations BMP. Therefore, water use evaluations conducted under this ICI BMP will not include irrigation evaluations. The evaluations for these facilities will consist of all other water uses (cooling, toilet flushing, food preparation, etc.).

4.4.6.1 County-Owned Facilities

MDWASD has identified approximately 100 County facilities, and 22 MDWASD-owned facilities located within their retail service area. This program will begin by addressing the MDWASD facilities first. This BMP consists of conducting evaluations (including leak detection), and implementation of water conservation measures (including repairing underground leaks).

Implementation Strategy

MDWASD will host workshops for Facility Managers of MDWASD-owned facilities to teach them how to use available EPA water audit software. Evaluation results will be ranked by potential savings and a retrofit program for the facilities with the highest water savings potential will be implemented. The evaluation results will also be used to determine the potential for undetected underground leaks. Facilities that have the greatest potential for underground leaks will receive leak detection services.

MDWASD will retrofit their own facilities with water-conserving hardware and other County departments will be encouraged to do the same through rebate incentives that may be provided as either a cash rebate or as a water bill credit.

MDWASD is exploring the possibility of using the first year of cost savings (from lower water use) to fund the Conservation Program. An implementation strategy being considered for County facilities that are not MDWASD facilities is using performance

contracting to perform water use evaluations and fund retrofits. Performance contracting is an innovative financing technique that uses cost savings from reduced utility (water and sewer) consumption to repay the cost of installing water conservation measures. Normally offered by water service companies (WASCOs), this technique allows for the development of a water-savings program without significant up-front capital expenses on the part of the user. Instead, the cost of water-efficiency improvements are borne by either the WASCO or a third party lender who recoups costs and shares water savings profits with the user.

Implementation Schedule

2006 – Train MDWASD Facility Managers to perform water use evaluations; MDWASD will collect managers' data and prioritize retrofit projects. Underground leak detection and repair will be implemented for facilities with the highest potential for leaks (schedule assumes 50 facilities).

2007 through 2010 – Retrofit MDWASD-owned facilities identified in 2006. Begin evaluations of other County-owned facilities (not MDWASD) in a similar manner as the MDWASD facilities or use a performance contractor. Then, begin retrofitting other County-owned facilities.

Implementation Costs

MDWASD anticipates assisting County owned facilities with water conservation funding for implementation of leak detection and repair, as well as for facilities retrofitted per ICI Water Use Evaluation recommendations. The Miami Dade Housing Authority is presently developing a Request for Proposals to address energy efficiency, including water conservation, in county owned public housing facilities. It is expected that performance contracts will be in place by 2007.

The leak detection and repair program is estimated to cost $4,740 per site.

Water Savings Rate

Water savings rates for an ICI program is highly variable and depends on site-specific parameters such as type of facility, age of piping, cooling equipment, operational hours, number of employees, occupied square feet, etc. MDWASD has estimated savings rates of 1,000 gpd/account for leak detection/repair and 1,500 gpd/account for evaluation and retrofitting County-owned facilities.

4.4.6.2 Water Conservation Hotel Program

MDWASD has identified 277 hotels in its retail service area. This BMP will be implemented in partnership with the FDEP Green Lodging Program and will be similar in part to SWFWMD's Water Conservation Hotel and Motel Program (CHAMP). The program will include a water audit, and retrofit of water fixtures with ultra-low volume models, and could potentially result in a linens and towels reuse program where bed linens and towels are washed every third day of a guest's stay rather than daily, unless requested otherwise by guests.

Implementation Strategy

The implementation strategy is to begin Program discussions with FDEP Green Lodging Program staff to determine implementation steps. Collection of useful data such as water use per occupied room will be needed to identify the hotels with the greatest potential for savings.

Implementation Schedule

The implementation schedule is contingent upon availability of Green Lodging Program staff; therefore, a conservative estimate of 12 hotels per year from 2006 through 2010 is used to estimate savings.

Implementation Costs

Since the program will be administered by the FDEP Green Lodging Program with MDWASD as a Technical Partner, only staff time commitment is anticipated, no costs is being assigned at this time.

Water Savings

A savings rate of 1,617 gpd/hotel is used based on savings identified by Southwest Florida Water Management District through their Water CHAMP. This savings rate correlates to a hotel with 50 to 100 rooms.

4.5 EFFECT OF WATER SAVINGS ON PROJECTED DEMANDS

Estimated water savings that are planned to occur were applied to demand projections presented in Section 3.5 to show the effect planned conservation may have. The adjusted demand projections are shown in Table 4-4.

Table 4-4
MDWASD System-wide Population and
Water Demand Projections adjusted for BMP Implementation

Year	Total System-wide Population Served (people)	Average Day Demand (MGD)	Water Savings due to Water Conservation BMP Implementation (MGD)*	Total Average Day with BMP Implementation (MGD)
2006	2,180,286	361.93	0.357254	361.570
2007	2,209,925	366.85	0.821268	366.026
2008	2,239,564	371.77	1.312482	370.455
2009	2,269,202	378.39	1.817296	376.570
2010	2,298,841	383.37	2.342510	381.023
2015	2,447,888	408.41	2.342510	406.067
2020	2,570,634	429.07	2.342510	426.723
2025	2,693,379	449.72	2.342510	447.378

MGD = million gallons per day

** Does not include existing or anticipated reclaimed water projects, or potential savings due to operational, educational or policy measures. Savings due to new BMPs that will be implemented beyond in year 2010 are also not included.*

These demand adjustments do not include potential effects from non-quantifiable water conservation measures discussed in Section 4.1 through 4.3. The BMPs that are responsible for the potential savings shown in Table 4-4 are not required by SFWMD WUP requirements. These savings are based on implementation that is in addition to savings that would be realized by implementing SFWMD required measures. Therefore,

the water savings and effect on demand is in excess of what would otherwise be required by SFWMD. Therefore, these actual savings should provide reasonable assurance that this goal-based Water Conservation Plan will provide effective water conservation at least as well as the water conservation requirements imposed by SFWMD as a condition of obtaining a Water Use Permit.

5.0 COST-EFFECTIVENESS EVALUATION OF QUANTIFIABLE BMPS

A cost-effectiveness evaluation was conducted for the quantifiable water conservation BMPs in this Plan. The purpose of the evaluation is to compare the cost to save a unit of water (typically expressed in cost/thousand gallons) to the cost to produce the same volume of water. The cost of water for MDWASD is $0.929/TG. Therefore, any BMP that costs less than $0.929/TG is cost effective because it costs less to conserve the water than to produce it.

5.1 BACKGROUND TERMINOLOGY AND CALCULATIONS

Table 5-1 is a list of water conservation cost effectiveness evaluation terminology. These terms are used in the implementation costs and cost-effectiveness calculations to follow.

Table 5-1 Water Conservation Cost Effectiveness Terms

Term (acronym)	Definition	Comments
Duration of Implementation (DOI)	The time horizon of the Water Conservation Implementation Plan	Conservation program implementation costs are evaluated across the DOI (not the WSH). However, it is assumed that the savings that accrue from the measures implemented will continue through the WSH. For MDWASD, the DOI is five years specifically 2006 through 2010.
Water Savings Horizon (WSH)	The time horizon over which water savings and cost/effectiveness are evaluated	Since many BMPs save water beyond the duration of implementation horizon (or Water Conservation Plan Horizon), it is better to evaluate the BMP's water savings and cost effectiveness beyond the implementation schedule. Although some BMPs may be considered to save water indefinitely, it is a typical practice to evaluate the water savings and effectiveness over a 20-year planning horizon. The default WSH will be 20 years. For MDWASD the WSH is 20 years, specifically 2006 through 2025.
Planning Year (Y)	The year for which water conservation implementation was planned/ implemented.	It is helpful to evaluate planned against actual savings, costs and cost effectiveness for singular planning years. Although the yearly savings will be lower and the cost effectiveness much higher than the savings and cost effectiveness evaluated over the WSH, this parametric will help to evaluate planned over actual costs, savings and cost effectiveness on a yearly basis.
Cost (C)	Cost to implement a BMP or set of BMPs for one year of implementation.	

Table 5-1 Water Conservation Cost Effectiveness Terms		
Term (acronym)	**Definition**	**Comments**
P_{DOI}	Present worth cost of implementing BMP(s) over the DOI expressed in 1^{st}-yr (of implementation) dollars.	For MDWASD, present worth costs are provided in 2006 dollars.
Yearly Water Savings (S_Y)	Water saved during a single planning year by implementing BMP(s) that began implementation that year.	
Cumulative Water Savings	Water savings that accrue each year based on previous implementation and BMPs beginning implementation in that year.	Water savings (in MGD) that were achieved by BMPs in the previous year continue to save into the following years. Therefore, those savings are added to savings that will occur from BMPs that are implemented in the current year. Savings continue to accumulate through the WSH.
S_{WSH}	Water savings evaluated over the WSH.	The water savings accumulate with each year.
Cost ratio	Cost per BMP	
Cost effectiveness (C/E)	The comparison of total costs relative to benefits; costs are expressed in dollars, but benefits can be expressed in another unit (e.g., a quantity of water). Reference: Florida's Water Conservation Glossary	For the purposes of this Plan, C/E will be calculated as follows: $\frac{\text{Present Worth Cost to implement BMP or Plan}}{\text{Water Savings from implementing BMP or Plan}}$
C/E_Y	Cost effectiveness of a BMP or Plan evaluated over one-year of implementation and water savings. Calculated as $\frac{C}{S_Y}$	Generally, the cost effectiveness of a BMP or Plan is low when evaluated over one year only. The purpose of using this term is to evaluate yearly implementation success. Neither yearly water savings nor costs should be evaluated separately. For example the actual cost to implement a BMP may be more than planned; however, the savings may also be greater. This term allows utilities to track BMP implementation effectiveness by considering both actual costs and savings.
C/E_{WSH}	Cost effectiveness of a BMP or Plan where the costs are evaluated over the duration of implementation and the savings are evaluated over the water savings horizon. Calculated as $\frac{P_{DOI}}{S_{WSH}}$	

Calculating Present Worth of Program Costs over the Duration of Implementation

The present worth cost of each BMP is calculated by summing costs associated with implementing the BMP over the BMP duration of implementation. The present worth cost for a BMP beginning in year 2006 with a five-year DOI is calculated as follows.

$$(P_{DOI})_{2006} = C_{2006} + C_{2007} \times (1 + i)^{-1} + C_{2008} \times (1 + i)^{-2} + C_{2009} \times (1 + i)^{-3} + C_{2010} \times (1 + i)^{-4}$$

Where:
- $(P_{DOI})_{2006}$ = Total present worth cost of program in 2006 dollars
- C_{2006} = Cost to implement BMP in 2006, etc.
- i = Interest rate of 5 3/8% (Conserve Florida default value)

Calculating Water Savings over the Water Savings Horizon

To determine total water savings over the WSH, it is assumed that the BMPs implemented in the final year of the DOI would continue to save water on an annual basis through the WSH. The DOI for this Plan is 5 years and the WSH is 20 years. For this case, the water savings in the fifth year are multiplied by 16 years. The water savings for a BMP with a DOI of 5 years and a WSH of 20 years is calculated as follows.

$$S_{WSH} = [S_{yr-1} + S_{yr-2} + S_{yr-3} + S_{yr-4} + (S_{yr-5} \times 16 \text{ years})] \times 365 \text{ days/yr}$$

Where:
- S_{WSH} = Water savings in million gallons (MG) over the WSH
- S_{yr-1} = Cumulative water savings in yr-1 (etc.) of BMP implementation in million gallons per day (MGD)

Calculating the Cost Effectiveness

BMP cost effectiveness is defined as the cost per 1,000 gallons of water saved for implementing the BMP. The cost effectiveness of a BMP that began implementation in 2006 is calculated as follows.

$$C/E_{WSH} = (P_{DOI})_{2006} \div (S_{WSH} \times 1{,}000 \text{ gallons/TG})$$

Where:
- C/E_{WSH} = Program cost effectiveness in dollars per 1,000 gallons (TG) over the WSH
- $(P_{DOI})_{2006}$ = Total present worth cost of program in 2006 dollars
- S_{WSH} = Total water savings in MG over the WSH

5.2 COST EFFECTIVENESS RESULTS

The estimated cost effectiveness of all the BMPs in this Plan (Table 5-2) are below the cost to produce the same volume of water and are considered to be cost-effective and therefore appropriate for MDWASD. Appendix A is a comprehensive accounting of each BMP's associated cost, yearly and cumulative savings and cost effectiveness. Appendix B shows costs and water savings for the operational, policy and educational measures where they could be quantified.

Table 5-2 Cost Effectiveness of Quantifiable BMPs			
MDWASD BMP	**Category**	**Sector**	**C/E_{WSH} (Cost per TG)[6]**
Water-Efficient Landscape and Irrigation Evaluations and Rebates with Rain Sensor Retrofit	Landscape & Irrigation Evaluations plus Rain Sensor Retrofit (without Rebate)[1]	SF	$0.153
		NR – County-owned	$0.031
	Landscape & Irrigation Evaluations plus Rain Sensor Retrofit (with Rebate)[2]	SF	$0.154
High-Efficiency Clothes Washer Rebate	Common-area Washers	MF with common-area Clothes Washers	$0.860
Ultra Low Flush (ULF) Toilet Retrofit/Rebate	Retrofit (includes showerhead and aerators)[3]	SF - Elderly	$0.604
		County-owned MF Housing	$0.000
	Rebate (toilet only)[4]	SF	$0.812
Showerhead Exchange	No Categories	SF	$0.006
Retrofit Kit Giveaway	No Categories	SF	$0.027
Industrial, Commercial and Institutional Water Use Evaluation/ Implementation	Leak Detection and Repair of County-owned Facilities	NR	$0.649
	Evaluate and Retrofit County-owned Facilities (not MF Housing Developments)[5]	NR	$0.147
	Hotel Program	NR	$0.000

SF = single family residential; MF = multi-family residential; NR = non-residential; TG = thousand gallons

Notes

Throughout Plan, costs do not include County staff labor.

[1] Cost includes labor to perform evaluation, install a rain sensor, and provide a report.

[2] Cost includes labor to perform evaluation, install a rain sensor, and provide a report, rebate to the customer, and cost to outsource rebate processing.

[3] Cost and savings include hardware and installation costs.

[4] Cost includes a rebate to the customer and the cost to outsource rebate processing.

[5] Cost is only for intradepartmental assistance from WASD to other County departments for retrofit. Assistance may be in the form of a rebate or water bill credit.

[6] Cost-effectiveness values of $0/TG are due to MDWASD not having to bear the cost of implementation.

6.0 BMP GOALS

BMP goals include cost effectiveness goals and water savings goals as shown in Appendix A. MDWASD will monitor goal achievement and adjust planned implementation to meet goals as discussed in Section 7.

7.0 REPORTING PLAN PROGRESS

MDWASD will provide annual progress reports on meeting goals established in this Plan (see Section 6) to the District. The annual reports will also provide an opportunity to propose alternative BMPs or implementation options to achieve goals. The key to the state-wide goal-based Water Conservation Program is flexibility. The utility can adjust their Plans to meet water savings and cost-effectiveness goals during Plan implementation. This allows the utility to learn from previous years' implementation results and use those lessons to improve upon the following years' planned effectiveness.

7.1 ANNUAL REPORTING

About six months after each planning year has ended, MDWASD will provide an annual report to the District that confirms continual implementation of non-quantifiable measures identified in Sections 4.1 through 4.3 and summarizes the number of measures implemented per BMP and actual dollars spent. MDWASD will also report actual savings gained by implementation using proposed savings rates presented in this Plan or proposing new savings rates as additional information becomes available and/or actual savings are measured.

The Annual Reports will compare planned against implemented numbers of measures, water saved/water savings rates, and the costs of implementation with respect to meeting planned goals. The report will also include an explanation of unanticipated delays or issues that modified the implementation schedule or cost effectiveness.

If MDWASD concludes that adjusting planned implementation will more effectively achieve established goals, a plan adjustment will be proposed for the District's approval.

7.2 FIVE-YEAR PLAN UPDATE

MDWASD will update this Five-Year Plan no later than April 2011, and every five years thereafter. A status report in scorecard format will be presented annually to the BCC during the month of April. The report will assess the progress and evaluate the proposed BMPs effectiveness. In addition to evaluating the implemented BMPs, the Annual Water Efficiency Report will include recommendations on new projects as well as additional quantifiable BMPs. Non-quantifiable BMPs and measures, including the education and public information components will be evaluated for effectiveness as well as on how well they complement the quantifiable BMPs. This evaluation will be use as the basis for budget and external funding requests.

8.0 GUIDANCE AND AUTHORITY

This Water Conservation Plan was duly adopted by the Miami-Dade County Board of County Commissioners on April ____, 2006 by adoption of the attached resolution.

A MDWASD interdisciplinary team provided input and participated in the final review of this document. The Plan was posted on the County's website for public review and comment on February 6, 2006, additional public comments were received at a public meeting on February 10, 2006. The Board of County Commissioners also offered the opportunity for public comment prior to approval of the Plan at the Infrastructure, Land Use and Environment Committee meeting held March 14, 2006.